Intro to Logic
Predicate Logic – Practice Proofs

1) 1. $\exists yFyy$
2. $\exists x\forall zGxz$ / $\exists x\exists y(Gyx \bullet Fxx)$

2) 1. $\exists x\exists yFxy$
2. $\forall x\forall y[Fxy \equiv (Gx \bullet \sim Gy)]$ / $\exists xGx \bullet \exists x\sim Gx$

3) 1. $\exists x\exists y(Fx \bullet Gyx)$
2. $\forall x\forall y[Gxy \rightarrow (Hx \bullet Jyx)]$ / $\exists x\exists y[(Fx \bullet Hy) \bullet Jxy]$

4) 1. $\forall z[\sim Hz \equiv \forall x(Fx \bullet Gz)]$
2. $\forall x\exists y(Gy \bullet Fx)$ / $\sim\forall xHx$

5) 1. $\forall x(\exists yFyx \rightarrow \forall zFxz)$ / $\forall y\forall x(Fyx \rightarrow Fxy)$

6) 1. $\forall x[Fx \rightarrow \forall y(Gy \rightarrow Hxy)]$
2. $\exists x(Fx \bullet \exists y\sim Hxy)$ / $\exists x\sim Gx$

7) 1. $\forall x[Kx \rightarrow (\exists yLxy \rightarrow \exists zLzx)]$
2. $\forall x(\exists zLzx \rightarrow Lxx)$
3. $\sim\exists xLxx$ / $\forall x(Kx \rightarrow \forall y\sim Lxy)$

8) 1. $\sim\forall x(Hx \vee Kx)$
2. $\forall x[(Fx \vee \sim Kx) \rightarrow Gxx]$ / $\exists xGxx$

9) 1. $\forall x[\exists y(Ay \bullet Bxy) \rightarrow Cx]$
2. $\exists y\{Dy \bullet \exists x[(Fx \bullet Gx) \bullet Byx]\}$
3. $\forall x(Gx \rightarrow Ax)$ / $\exists x(Cx \bullet Dx)$

10) 1. $\forall x\forall y\forall z[(Fxy \bullet Fyz) \rightarrow \sim Fxz]$ / $\forall x\sim Fxx$

11) 1. $\forall x\forall y\forall z[(Fxy \bullet Fxz) \rightarrow Fyz]$
2. $\forall x\forall y(Fxy \rightarrow Fyx)$
3. $\forall xFxx$ / $\forall x\forall y\forall z[(Fxy \bullet Fyz) \rightarrow Fxz]$

12) 1. $\forall x(Dx \rightarrow Fx)$ / $Da \rightarrow [\forall y(Fy \rightarrow Gy) \rightarrow Ga]$

13) 1. $\forall x\forall y(Fxy \rightarrow Fyx)$ / $\forall x\forall y(Fxy \equiv Fyx)$

14) 1. $\exists x(x{\neq}a \bullet Gx)$ / $\exists xGx \bullet [Ga \rightarrow \exists x\exists y(Gx \bullet Gy \bullet x{\neq}y)]$

15) 1. $\exists x\forall y(y{=}x \equiv Gy)$ / $\forall xGx \rightarrow \forall x\forall y(x{=}y)$

16) 1. $\exists x \forall y(y=x \equiv Gy)$ / $\forall x \forall y[(Gx \bullet Gy) \rightarrow x=y]$

17) 1. Sj
2. $\forall x(x \neq j \rightarrow Sx)$ / $\forall x Sx$

18) 1. $\forall x \forall y[x \neq y \rightarrow (Fx \vee Fy)]$ / $\exists x \forall y(y \neq x \rightarrow Fy)$

19) 1. $\exists x \exists y[(Fx \bullet Fy) \bullet x \neq y]$
/ $\exists x \exists y \exists z\{[(Fx \bullet Fy) \bullet Fz] \bullet x \neq y \bullet y \neq z \bullet x \neq z\}$